

BE-07

**EFFORTS TO PROMOTE CRITICAL THINKING THROUGH
COOPERATIVE LEARNING TYPE THINK TALK WRITE ASSIGNMENT
BASED ON BASIC GENETICS**

Imas Cintamulya

University of PGRI Ronggolawe Jl. Manunggal No.61 Tuban, East Java

Abstract

This study aims to encourage critical thinking skills of students in learning basic genetics. To answer these objectives the research conducted on students of Biology Education class of 2011, amounting to 89 people. Design of experiments using the One-Shot Case Study. The treatment of the application of cooperative learning model type Think Talk Write (TTW) based assignments carried out during one semester. The results of the study after analysis showed that students' critical thinking skills and a good knowledge of genetic categorized reached more than 60%. Based on this it can be concluded that the application of cooperative learning model type Think Talk Write (TTW) based assignments can encourage students' critical thinking skills in basic genetics course.

Key words: Think Talk Write, assignment, critical thinking, knowledge, and basic genetics.

INTRODUCTION

Basic genetics course is a compulsory subject in Biology Education studies Program with weights 3 credits. Competencies expected of a basic genetics course, students can understand the basic concepts of genetics and are able to apply in life. In addition, knowledge of basic genetics needs to be understood by the students, to be able to follow further genetic problem that continues to evolve at this time.

Reality in the learning process in the classroom, students are still difficult to understand the problems in basic genetics. Students tend to be passive in the activity of thinking, they are more notes without knowing the meaning of what is on record. This can be seen from any activity to work on the problems ahead, they many not be able to finish. In addition, each asked the basic concepts, they also can not answer correctly. As a result, the students' scores for each class on basic genetics course, low average, more than 50% mostly get a grade of C. Because this study was conducted over the use of conventional learning model, dominated by the lecture method, although occasionally interspersed with discussion method. So much more emphasis on memorization rather than learning to construct a concept. One of the potential of the intelligentsia will be required for each person in their life is the ability to think critically. Therefore, to overcome the problems in learning basic genetics, need a model and a method of learning that can enable students to think critically so that they can overcome the difficulties they experienced.

The learning model is considered appropriate to be applied in learning basic genetics is cooperative learning . Through cooperative learning students are expected to work in small groups to be able to help each other in studying the material and do the basic genetic questions . Besides that students can discuss and argued, with the aim to hone the knowledge that it controls the time and address gaps in understanding each (Slavin , 2008). Cooperative learning model seems right to be able to empower students thinking skills in basic genetics course, is a Think Talk Write (TTW) learning model developed by Huinker and Laughin (Listiana, 2013). In order for Think Talk Write (TTW) learning model used in basic genetic learning to be effective , then use the method deemed appropriate assignment , which aims to complement the lecture and discussion method that has been used .

Based on the above it is necessary to do research on the application of cooperative learning model type Think Talk Write based assignment, to encourage critical thinking in students Unirow Biology Education on basic genetics course .

The problems that arise from this research is:" Is the application of cooperative learning model type Think Talk Write based assignments encourage Unirow Biology Education students think critically at basic genetics course? to "With the objectives of this research is to encourage Unirow Biology Education students to think critically on basic genetics course. If critical thinking is empowered expected to increase academic achievement in basic genetics course.

RESEARCH METHOD

Subjects were students of class of 2011 Biology Education Study Program University of PGRI Ronggolawe Tuban contracting basic genetics courses, totaling 89 people. The design used in the study is the design of experimental One-Shot Case Study (Sugiono, 2008). Research carried out by giving treatment to learning the genetic basis for one semester. The treatment in this study is the application of cooperative learning model type Think Talk Write (TTW) with assignment method. Parameters measured were critical thinking skills and knowledge of students about basic genetics.

The steps in the research include the preparation and conduct of the study. Preparation of study include : First prepare the basic genetic material for one semester with the topic refers to the basic genetics book Tjan Kiauw Nio (1991), which include : 1) introduction ; 2) how the trait is inherited ; 3) a pair of single-gene inheritance ; 4) free inheritance of two pairs of genes (trihibrida and polihibrida) ; 5) modification of the ratio of 9:3:3:1 (interaction and epistasi) ; 6) multiple alleles ; 7) double gene ; 8) sex determination ; 9) inheritance of genes on the sex chromosomes ; 10) properties are influenced sex ; 11) properties that are confined to one sex ; 12) linkage and crossovers ; 13) Chemical structure of the genetic material ; 14) gene mutation ; and 15) chromosomal mutation . Second split group by referring to Herliani (2013) in which members of each group of between 4-5 students , this is done so that the application of cooperative learning model type Think Talk Write (TTW) effectively .

Implementation research on the application of cooperative learning model type Think Talk Write (TTW) on the genetic basis of referring DePorter (1992) were modified include: First, the students were assigned at home to read and understand the topics that will be covered in each meeting. This assignment more emphasis on understanding the concepts and important principles of basic genetics to be able to work on the problems of genetics. Second, students are actively involved in group discussions to solve any problems that occur, are required to be able to communicate with an understanding of the basic genetic material. Third students were told to write back the result of learning gained in the class. At this stage the student alternately from each group to solve problems systematically and correctly.

The instrument used to collect data for the critical thinking skills of students about basic genetics are: 1) The problems sheet of genetic that must be done of student in front of a class at each meeting which refers to Kiauw Nio Tjan (1991) and 2) the observation sheet. Meanwhile, to collect data about the students' knowledge basic genetics is genetics questions that must be answered student in oral tests conducted at the end of the course. Indicator of the ability of critical thinking refers to standardization by Paul (and Eider 2007) include: clarity, accuracy, precision, depth, breadth, and logic the modified adjusted with basic genetics course. The critical thinking indicators as shown in Table 2. 1.

Table 2. Indicators Used to Assess Critical Thinking Skills

No	Component	Score
1.	Students can work on the problems carefully and systematically	
2.	Students can write information and symbols used in genetics with a clear, correct, and complete	
3	Students can write Breket system with clear, correct, and systematic	
4.	Students can write to a logical conclusion based on questions	
5.	The Final results / answer correct student	
6.	Students can work on any problem in quick time	

To see the critical thinking skills of students observed move forward in every meeting, as many as 14 meetings. Scores are used for each component is 0 for not performing and has been completed in the given score of 1. The value obtained is the total score is: 6 (A), 5 (AB), 4 (B), 3 (BC), 2 (C), and 1 (D). Indicators for basic genetic knowledge seen from the number of correct answers given test. Scores are used 91-100 (A); 81-90 (AB); 71-80 (B); 61-70 (BC); 51-60 (C); 41-50 (D); and 0-40 (E).

RESULT AND DISCUSSION

Result

Data obtained from this study are presented in Table 3.1 and Table 3.2 .

Table 3.1 Value of Critical Thinking Ability Students in the Course Basic Genetics

No.	Value	Number of Student	Pesentase	Specification
1	D	18	20,23%	35,97%
2	C	7	7,87%	
3	BC	7	7,87%	
4	B	15	16,85%	64.03%
5	AB	20	22,47%	
6	A	22	24,72%	
Total		89	100 %	

Table 3.2 Value of Student Knowledge in the course Basic Genetics

NO	Value	Number of Student	Presentase	Specification
1	D	10	11,24%	37,10%
2	C	11	12,36%	
3	BC	1 2	13,50%	
4	B	28	31,46%	62,90%
5	AB	18	20,23%	
6	A	10	11,24%	
Total		89	100%	

Discussion

Table 3.1 shows that the students' ability to think critically on the basic genetics are categorized well, more than 60%. While critical thinking skills categorized low, less than 40%. Table 3.2 shows that the students knowledge about the basic genetics who got good grades, more than 60%. While that scored low, less than 40%.

Students who lack critical thinking skills generally they can only do one of the following stages: 1) write down the information and symbols used in genetics is correct and complete; 2) write Breket system properly and systematically; and 3) final result/ correct answer. Students in this category are generally in working on the problems of genetics they are not systematic, they write conclusions are usually not relevant to the question, and they usually do it in a hurry. This happens, because they usually cheat his job, so it looks time to do it without going through the process of thinking, they write what is in the books workers. While students are categorized capacity to think better, generally they do the problems without carrying a notebook, stages the process is done systematically. Thus means that the implementation of cooperative learning model type Think Talk Write (TTW to encourage critical thinking skills and increase the knowledge of students in learning basic genetics.

Critical thinking of students in learning basic genetics empowered through cooperative learning type Think Talk Write the results are good. This is because cooperative learning model type Think Talk Write a structured cooperative learning model, which requires the ability to think and reflect in coordinating ideas before learners are asked to write. Additionally cooperative learning model type Think Talk Write also provide opportunities for learners to understand the problem first before doing group discussions, then the results obtained can learn to write their own language. The role of the lecturer in cooperative learning model type Think Talk Write include: 1) ask questions and tasks that bring engagement, and challenge learners to think; 2) listen carefully the idea of learners; 3) asked learners express ideas orally and in writing; 4) decide what is unearthed and brought learners in the discussion; 5) decide when to inform cooperative Think Talk Write, clarify issues, using the model; guide and let learners struggle with difficulties; 6) monitor and assess learners in preparation for discussion and decide when and how to encourage each learner to participate (Listiana; 2013). The benefits of the application of cooperative learning model type Think Tlak Write makes learners become responsible person, can help each other among fellow learners with respect, and most importantly, learners can build a positive self-concept (Suyanto, 2010).

In addition to cooperative learning model type Think Talk Write the effect on students' critical thinking skills in the learning of basic genetics is the use of the method of assignment. Assignment method is used to supplement the lecture method. The method requires the provision of task assignment and the presence of responsibility of the learner (MKPBM Team, 2001). Through the application of the method of assignment, caused students always do exercises, learn in advance the topics to be discussed, to find sources of relevant information, use their spare time to read and understand the material that will be discussed at the next

meeting. In addition to the method of assignment, students are better able to foster explorative learning process by exploring the information from various sources to create independence in the learning process and get used to thinking critically in each of the problems it faces.

Based on the above, the potential for critical thinking in students need to be empowered in the learning process. This is consistent with the proposed Manahal (2012) that one of the potential of the intelligentsia will be required for each person in their life is the ability to think critically. Critical thinking skills do not develop naturally but must be developed through a learning process. Critical thinking and critical action a skill that is required to develop in education, especially in universities. Critical thinking needed in today's era of knowledge, so that each student is able to deal with complex problems (Trilling and Hood, 1999; Galbreath, 1999).

Critical thinking is a common term of one of the critical activities, including the idea of critical thinking, which is its representation in the form of action, speech, writing, and so on. Critical thinking is a process of mental activities that include a critical assessment, evaluation, reflection, critical understanding and so on. Primary mental activity is the assessment of critical thinking, which is useful for making a decision. Critical thinking is an aspect of the activity of thinking is a form of learning. As a form of learning, critical thinking can be a tool to generate new knowledge by processing existing knowledge through ideas, so it is referred to as a tool to manipulate knowledge (eg, analysis, understanding, synthesis). Other words double critical thinking is a tool for memanipulasi knowledge. Critical thinking is an approach that is usually associated with a complex problem. Moon (2008) have identified a variety of activities in critical thinking, namely: 1) a review of the opinions of others; 2) evaluation of the object; 3) the development of opinion; 4) think critically about themselves; 5) an overview of the events; 6) respond constructively to others' opinions; 7) critical thinking as a habit in the face of this world.

CONCLUSION AND SUGGESTION

Based on indicators of students can work on the problems carefully and systematically; write to captions and symbols used in genetics with a clear, correct, and complete; write to Breket system clearly, correctly, and systematic; write to the logical conclusion and in accordance with any questions; final results / answer correct student; working on each problem in a short time; and oral test results showed good results. The application of cooperative learning model type Think Talk Write (TTW) based assignment can encourage critical thinking skills and knowledge of Unirow Biology Education students in basic genetics course. Critical thinking skills and knowledge of students about basic genetics can be used as a potential to be able to understand the basic concepts of genetics and are able to apply in life.

Critical thinking as an intellectual potential should be owned by every person in his life, so critical thinking is essential to be empowered in any learning process

REFERENCES

- Galbreath J. 1999. Preparing The 21st Century Worker: The Link Between Computer Based Technology And Future Skill Sets. *Educational Technology*.
- Herliani,. 2013. *Penerapan Model Pembelajaran kooperatif Tipe ThinK Talk Write (TTW) dalam Upaya Meningkatkan Hasil Belajar dan Kemampuan Berpikir Kritis Siswa pada Mata Pelajaran Biologi di SMA Negeri 8 Samarinda*. Makalah disajikan dalam Seminar Nasional X Biologi, Sains, Lingkungan, dan Pembelajarannya. Volume I. Program Studi
-

- Pendidikan Biologi FKIP Universitas Sebelas Maret. Surakarta: 353-363.
- Listiana, L. 2013. *Pemberdayaan Keterampilan Berpikir dalam Pembelajaran Biologi Melalui Model Kooperatif Tipe GI (Group Investigation) dan TTW (Think, Talk, Write)*. Makalah disajikan dalam Seminar Nasional X Biologi, Sains, Lingkungan, dan Pembelajarannya. Volume I. Program Studi Pendidikan Biologi FKIP Universitas Sebelas Maret. Surakarta: 410-418.
- Mahanal, S. 2012. *Strategi Pembelajaran Biologi, Gender dan Pengaruhnya terhadap Kemampuan berpikir Kritis*. Makalah disajikan dalam Seminar Nasional IX Biologi, Sain, Lingkungan, dan Pembelajarannya dalam Upaya Peningkatan Daya Saing Bangsa. Program Studi Pendidikan Biologi FKIP Universitas Sebelas Maret. Surakarta: 179- 184.
- Moon, J. 2008. *Critical Thinking An Exploration of Theory and Practice*. New York. Routledge Taylor & Francis Group.
- Paul and Elder.2007. *The Miniature Guide to Critical Thingking Concepts and Tools*. Near University of California at Berkeley.The Foundation for Critical Thingking.
- Slavin, R. E., 2008. *Cooperative Learning (Teori, Riset, dan Praktik)*, Ujung Berung Bandung: Penerbit Nusa Media.
- Sugiono.2008. *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Bandung: Alfabet.
- Suyatno, R. 2010. *Inovativ to creative thinking. Model TTW*.
- Tim MKPBM. 2001. *Common Text Book Strategi Pembelajaran Matematika Kontemporer*. JICA Tecncial Cooperation Projector For Development of Scince and Mathematics Teaching for Primary and Scondary Education in Indonesia (IMSTEP). Universitas Pendidikan Indonesia (UPI).
- Tjan Kiauw Nio. 1991. *Genetika Dasar*. Jurusan Biologi-FMIPA Institut Teknologi Bandung.
- Trilling, B. And Hood, H.1999. Learning, Tecnology, and eEducation Reform in the Knowledge Age or "We're Wired, Webbed, and Windowed, Now What?" *Educational Technology/May-June 1999*.